

What is claimed is:

1. A method of optically inspecting and evaluating a sample, the method comprising the steps of:

5 repeatedly illuminating a substantial portion of the sample at a succession of spectral ranges;

gathering the illumination reflected by the substantial portion of the sample at each spectral range; and

analyzing the gathered illumination to generate a measurement describing a physical property of the sample.

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2. A method as recited in claim 1 that further comprises the steps of:

generating a probe beam using a broad spectrum illumination source; and

colorizing the probe beam by passing it through a selected portion of a variable color filter.

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3. A method as recited in claim 1 that further comprises the step of: illuminating the sample by enabling one of a series of illumination sources where each illumination source produces light within a respective spectral range.

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4. A method as recited in claim 1, wherein the step of gathering the illumination reflected by the substantial portion of the sample is performed using a series of optical systems, each configured to gather illumination reflected by a respective sample portion.

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5. A device for optically inspecting and evaluating a sample, the device comprising:

a plurality of individual light sources each emitting light at a different spectral range:

a plurality of optical fibers, each associated with a respective light source;

means for selectively transmitting light emitted from one of the fibers to

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illuminate a large area of the sample;

a detector having an array of elements configured to measure light reflected from the sample, the elements generating output signals that can be mapped to particular measurement regions on the sample; and

5 a processor for evaluating characteristics of the sample based on the output signals.

6. A device as recited in claim 5, wherein the entire sample is illuminated.

7. A device for optically inspecting and evaluating a sample, the device
10 comprising:
a broadband light source;
a filter for selectively transmitting a narrow spectral range of light, wherein the transmitted light is used to illuminate a large area of a sample;
a detector having an array of elements configured to measure light reflected
15 from the sample, the elements generating output signals that can be mapped to particular measurement regions on the sample; and
a processor for evaluating characteristics of the sample based on the output signals.

20 8. A device as recited in claim 7, including a means for adjusting the filter to transmit successive, different spectral ranges of light.

9. A device as recited in claim 7, wherein the entire sample is illuminated.

25 10. A device as recited in claim 7, wherein the illuminated area is in the shape of an extended rectangle.

11. A method of optically inspecting and evaluating a sample, the method comprising the steps of:

30 (a) illuminating the sample by enabling one of a series of illumination sources, where each illumination source produces light within a respective spectral range;

(b) gathering an image of the sample illuminated by the enabled illumination source; and

(c) repeating steps a and b while changing the selected illumination source to gather a series of images of the sample illuminated by a series of spectral ranges.

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12. A device for optically inspecting and evaluating a sample, the device comprising:

an illumination system for illuminating a large area of the sample;

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a dense array of micro lenses, each lens configured to gather light reflected by a particular measurement regions on the sample;

a series of detectors each paired with a respective micro lens and measurement region, each detector creating an output signal corresponding to its measurement region; and

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a processor for evaluating characteristics of the sample based on the output signals.

13. A device as recited in claim 12, wherein the illumination system comprises:

a plurality of individual light sources each emitting light at a different spectral range:

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a plurality of optical fibers, each associated with a respective light source; and means for selectively transmitting light emitted from one of the fibers to illuminate a large area of the sample.

14. A device as recited in claim 12, wherein the illumination system comprises:

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a broadband light source; and
a filter for selectively transmitting a narrow spectral range of light, wherein the transmitted light is used to illuminate a large area of a sample.